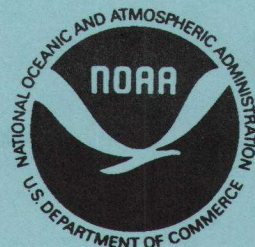
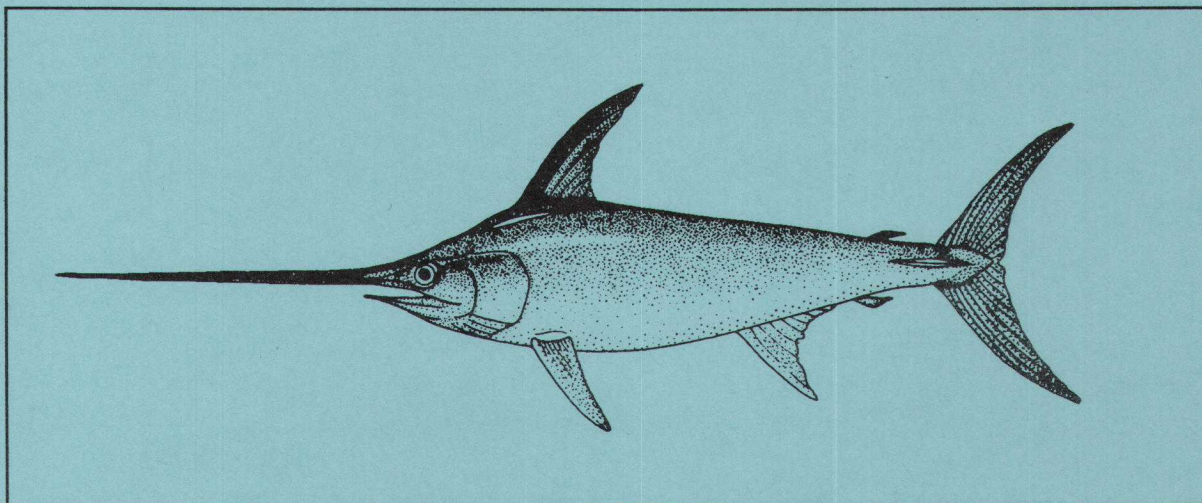


NOAA Technical Memorandum NMFS-SEFC-270



SWORDFISH LOGBOOK NEWSLETTER 1990



November 1990

Mark I. Farber

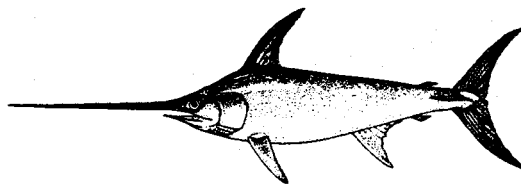
U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Center
75 Virginia Beach Drive
Miami, FL 33149

NOAA Technical Memorandum NMFS-SEFC-270

SWORDFISH LOGBOOK NEWSLETTER 1990¹

by

Mark I. Farber



U.S. DEPARTMENT OF COMMERCE
Robert A. Mosbacher, Secretary

National Oceanic and Atmospheric Administration
John A. Knauss, Administrator

National Marine Fisheries Service
William W. Fox, Jr., Assistant Administrator for Fisheries

November 1990

This Technical Memorandum series is used for documentation and timely communication of preliminary results, interim reports, or similar special-purpose information. Although the memoranda are not subject to complete formal review, editorial control, or detailed editing, they are expected to reflect sound professional work.

¹Contribution MIA-90/91-01 from the Southeast Fisheries Center, Miami Laboratory, Oceanic Pelagics Division

NOTICE

The National Marine Fisheries Service (NMFS) does not approve, recommend or endorse any proprietary product or material mentioned in this publication. No reference shall be made to NMFS, or to this publication furnished by NMFS, in any advertising or sales promotion which would indicate or imply that NMFS approves, recommends, or endorses any proprietary product or proprietary material mentioned herein or which has as its purpose any intent to cause directly or indirectly the advertised product to be used or purchased because of this NMFS publication.

This report should be cited as follows:

Farber, M. I. 1990. Swordfish Logbook Newsletter 1990. NOAA Technical Memorandum NMFS-SEFC-270, 9p.

Copies may be obtained by writing:

Mark I. Farber
National Marine Fisheries Service
Southeast Fisheries Center
Miami Laboratory
75 Virginia Beach Drive
Miami, FL 33149

The mandatory swordfish logbook program was initiated October 1986. Tens of thousands of logbook forms have been received and processed by NMFS, Southeast Fisheries Center. This newsletter is designed to explain how the data are being used, and to provide some results and summaries of these data. Topics included in this first newsletter are: (1) A description of the process involved in handling the logbook forms; (2) summaries for the 1987 and 1988 data of (a) numbers of swordfish, tunas and billfish caught by area with associated effort in hooks fished; and (b) quarterly and yearly breakdown of reported numbers of swordfish and yellowfin tuna caught, reported effort and catch-rates by area; (3) preliminary summaries of the 1989 data; (4) maps of reported fishing locations for 1987, 1988 and 1989; (5) discussion of the revisions to the 1991 logbook forms; and (6) names of people to contact for further information.

AN OVERVIEW OF THE PROCESSING OF SWORDFISH LOGBOOK DAILY FORMS

Upon receipt of the forms, those reporting no fishing are separated out, consecutive sequence numbers are stamped on each sheet, and each form is visually scanned for clarity and obvious errors. Forms are then sent to data entry where all the information is coded into a computer file. Computer programs are executed that identify possible errors and identify records that actually represent a trip rather than a single set.

Errors may be due to data entry or the recording of incorrect or illegible data by the captain. Items checked include: illogical latitude-longitude locations; the off-loading date being before the set date; the day of the month not being greater than 28 or 30 or 31 (depending on the month); many tunas released when none are kept; or the number of tunas or billfish not being "abnormally" high. For example, 63 yellowfin kept could represent a very good day fishing, or it could have been 36 fish kept (hence a data entry mistake), or it could represent more than one days fishing - hence representing a trip or the tending/rebaiting of the longline, which is the incorrect use of the logbook DAILY forms. The inclusion of multiple set information (i.e., trips) on a DAILY log form can bias analysis of catch-rate

data. Also, duplicate (or triplicate) dates for the same vessel must be addressed, and determination made as to whether the date was incorrectly reported or if the entire form represents a duplicate of a previously submitted form. It is worth noting that literally thousands of the sheets are checked and corrected before any analysis is undertaken.

Once all identified errors are corrected, summary tables - by species, by area, by time strata - are prepared, which in turn are used in analysis. There are many additional quality control steps that precede analysis but are not discussed here.

The swordfish logbook data forms represent a vital source of information necessary for scientists to assess the status of the swordfish stocks. The logbooks are the sole source of temporal and areal swordfish catch-rate information from the U.S. commercial longline fishery. The logbook data provide the best estimates of total numbers of swordfish, yellowfin, other tunas, and billfish caught (including those released) from the longline fishery. The logbook data are used in conjunction with the voluntary captain/dealer trip weighout records to extract effort information. These data allow scientists to quantify the hearsay reported changes in gear, fishing areas, and species composition of the catch. Further, logbook data are used to estimate billfish bycatch mortality. For these reasons, significant effort is expended by NMFS scientific personnel in order to detect and correct all types of errors. But data analysis can only be as good as the database. Therefore, it is critical to have accurate and complete reporting on the DAILY logbook forms; in particular, for the gear information, fishing location, and numbers of each species caught.

COMPARISON OF 1987 AND 1988 LOGBOOK CATCH AND EFFORT DATA

In June 1990 a two-part manuscript was completed that documented the in-depth comparison of the 1987-1988 swordfish logbook data (Comparison of Mandatory Swordfish Logbook Data for 1987-1988: Part I: Analysis and Part II: Tables). That report is an update and expansion of the August 1988 Analysis of Mandatory Swordfish Logbook Data for the Period

October, 1986 - September, 1987. The 1990 report: develops suggestions for improving data recording and coding steps to make the quality control stage more efficient; presents summary tables of reported catches (both kept and discarded) and catch-rates; addresses the question of swordfish directed sets versus tuna directed sets; addresses billfish discards; and looks at the sensitivity of the results to possible reductions in sampling effort from the 100% census requirement. Copies of these reports may be obtained from the author by writing: Mark I. Farber, Southeast Fisheries Center, NMFS, 75 Virginia Beach Drive, Miami, FL 33149.

Several summary tables are included in this newsletter. Tables 1a-1c represent the numbers of swordfish, tunas and billfish reported caught, by area, with associated reported effort in hooks for 1987, 1988 and (preliminary) 1989, respectively. The 1989 data were not analyzed in the 1990 report because 1989 logbook data were still being received at the time of the analysis. However, the preliminary 1989 catch and effort summary data are now available and are presented in Table 1c for comparison. For instance, in 1987 there were approximately 117,000 swordfish and 62,000 yellowfin reported caught (i.e., kept plus discarded); in 1988 there were approximately 160,000 swordfish and 53,000 yellowfin reported caught; and in 1989 there were approximately 179,000 swordfish and 56,000 yellowfin reported caught. This represents an increase in swordfish of 53% and a decrease in yellowfin of 9% over the period 1987 to 1989. The reported swordfish catch increased in each successive year in the Gulf of Mexico (GOM), Florida East Coast (FEC), South Atlantic Bight (SAB), North East Coastal (NEC), North East Distant (NED), and North Equatorial (NOREQ) areas. (See Figure 1 for definition of areas). In the Mid Atlantic Bight (MAB) and central North Atlantic (OTHER) areas the reported swordfish catch increased from 1987 to 1989; only in the Caribbean (CAR) did the reported catch decrease (slightly) from 1987 to 1989. The reported yellowfin catch decreased in each successive year in the GOM and increased in each successive year in the MAB.

Reported fishing effort for the three years was roughly 6.8, 6.7, and 7.3 million hooks, respectively (Tables 1a-1c); an overall increase of 7% from 1987 to 1989. Reported effort decreased substantially in each successive year in the GOM (a total of nearly 38% decrease from 1987 to 1989). Conversely, reported effort increased in each successive year in every other area.

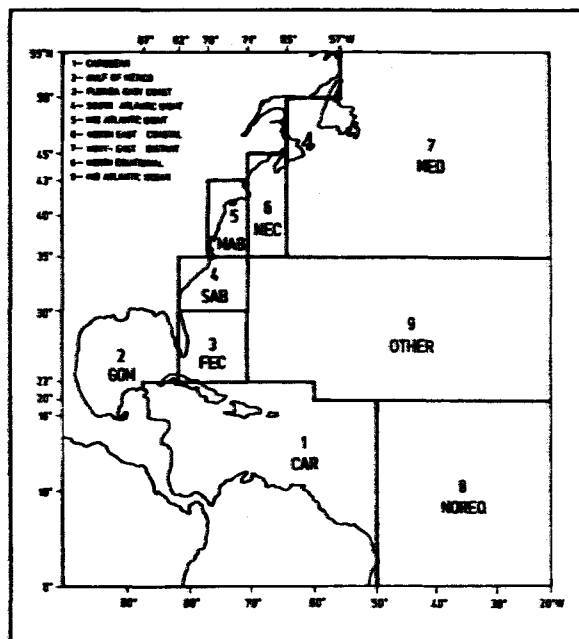


Figure 1. Map designating the nine areas used in analysis of the swordfish logbook data.

REPORTED FISHING LOCATIONS IN 1987, 1988, AND 1989

The location of reported fishing effort by year for 1987-1989 is shown in Figures 2-4. The general pattern for reported sets is very similar across the three years, with some expansion of the fishery towards the central North Atlantic (Area 9-OTHER) and into the Caribbean (Area 1-CAR) in 1989. However, note that 1989 data are preliminary at this time and all "unusual" locations have not been verified.

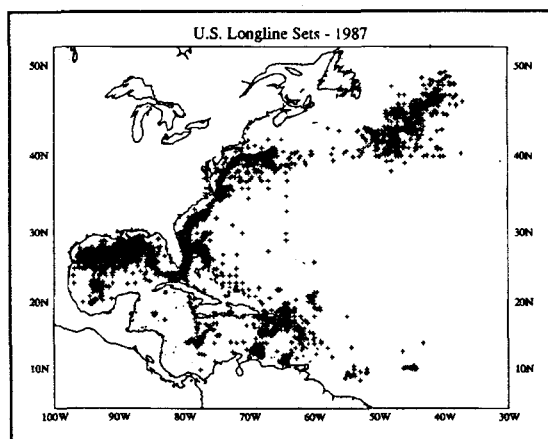


Figure 2. Map showing the location of reported fishing effort in 1987.

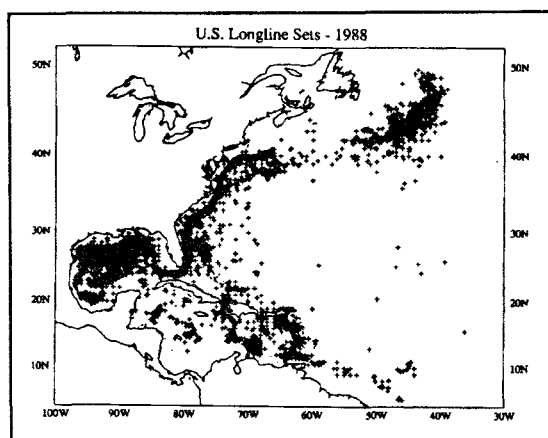


Figure 3. Map showing the location of reported fishing effort in 1988.

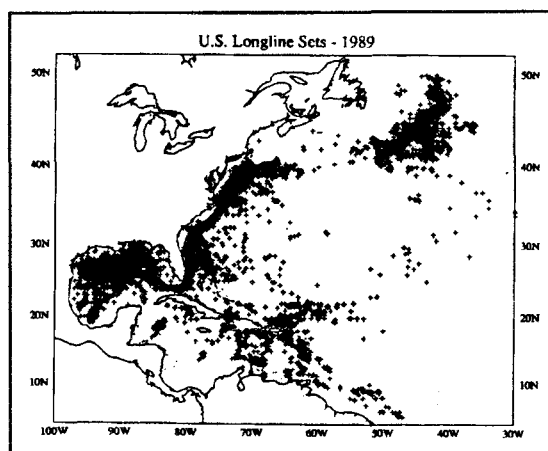


Figure 4. Map showing the location of reported fishing effort in 1989 (preliminary).

COMPARISON OF 1987 AND 1988 LOGBOOK CPUE DATA

Tables 2(a), (b) and (c) represent 1987, 1988 and (preliminary) 1989 data, respectively, for swordfish and yellowfin tuna. These data are yearly totals, by areas as (defined in Figure 1) for: effort in HOOKS; number of fish KEPT; number DISCARDED; Kept + Discarded; the overall catch rate in units of numbers of fish caught per 100 hooks [$100(K+D)/\text{HOOKS}$]; the Number of sets; and the average of the individual catch rates, $AV(C/E)$ (equivalent to CPUE).

The highest average catch rates (i.e., CPUE) for swordfish, on an annual basis, were consistently from the North East Distant (Area 7-NED) fishery and the South Atlantic Bight (Area 4-SAB). In 1987 the catch rates in these areas were approximately 3.9 fish/100 hooks and 5.6 fish/100 hooks (Table 2a), respectively. In 1988 the catch rates in these areas were approximately 4.7 fish/100 hooks and 4.1 fish/100 hooks (Table 2b), respectively. In 1989 the preliminary catch rates in these areas were approximately 4.2 hooks and 3.9 fish/100 hooks (Table 2c), respectively.

The highest average catch rates for yellowfin, on an annual basis, were consistently from the Gulf of Mexico (Area 2-GOM) fishery, the Mid Atlantic Bight (Area 5-MAB), and the North East Coastal fishery (Area 6-NEC). In 1987 the catch rates in these areas were approximately 1.4 fish/100 hooks in the GOM, and 1.1 fish/100 hooks in both the MAB and NEC (Table 2a). In 1988 the catch rates in these areas were approximately 1.3 fish/100 hooks in both the GOM and MAB, and 0.8 fish/100 hooks in the NEC (Table 2b). In 1989 the preliminary catch rates in these areas were approximately 1.3 fish/100 hooks in the GOM and 1.1 fish/100 hooks in both the MAB and NEC (Table 2c).

Quarterly summaries of CPUE's (in fish/100 hooks) and reported effort (in thousands of hooks) are presently graphically for Areas 1-7 (CAR, GOM, FEC, SAB, MAB, NEC and NED) for 1987, 1988 and 1989 (preliminary) for swordfish as Figures 3(a), 4(a) and 5(a), respectively, and for yellowfin tuna as Figures 3(b), 4(b) and 5(b). Quarters are defined as: 1 = January - March; 2

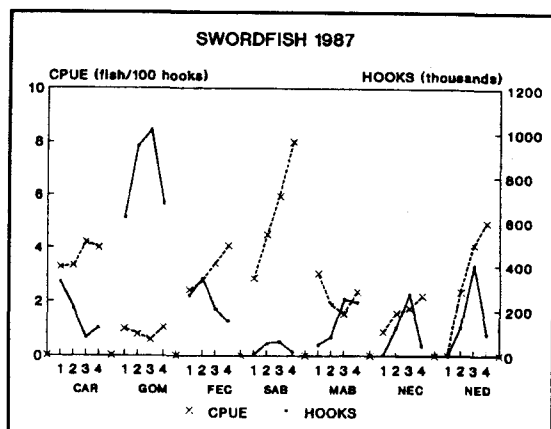


Figure 3a. Quarterly summaries of CPUE (fish/100 hooks) and reported effort (thousands of hooks) for swordfish in 1987 for areas CAR, GOM, FEC, SAB, MAB, NEC and NED.

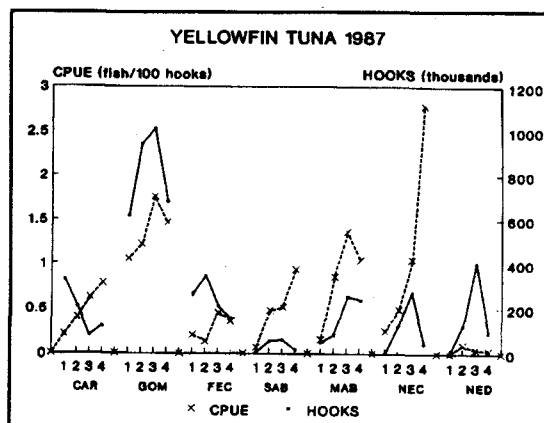


Figure 3b. Quarterly summaries of CPUE (fish/100 hooks) and reported effort (thousands of hooks) for yellowfin tuna in 1987 for areas CAR, GOM, FEC, SAB, MAB, NEC and NED.

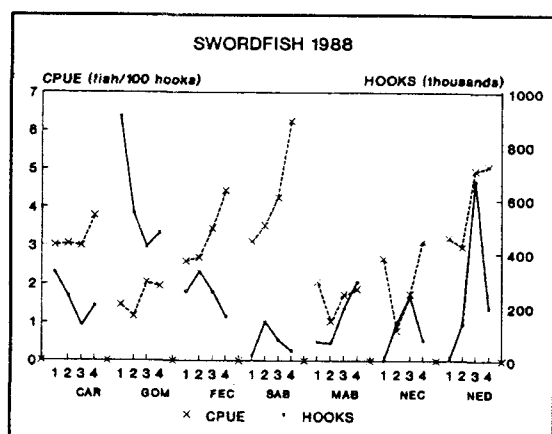


Figure 4a. Quarterly summaries of CPUE (fish/100 hooks) and reported effort (thousands of hooks) for swordfish in 1988 for areas CAR, GOM, FEC, SAB, MAB, NEC and NED.

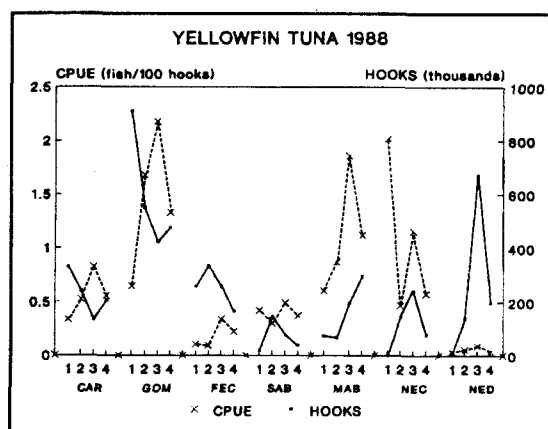


Figure 4b. Quarterly summaries of CPUE (fish/100 hooks) and reported effort (thousands of hooks) for yellowfin tuna in 1988 for areas CAR, GOM, FEC, SAB, MAB, NEC and NED.

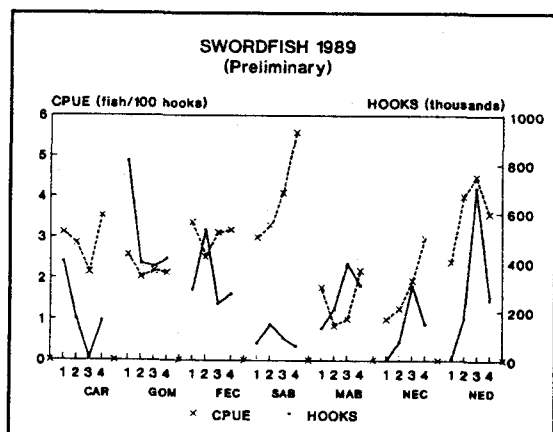


Figure 5a. Quarterly summaries of CPUE (fish/100 hooks) and reported effort (thousands of hooks) for swordfish in 1989 (preliminary) for areas CAR, GOM, FEC, SAB, MAB, NEC and NED.

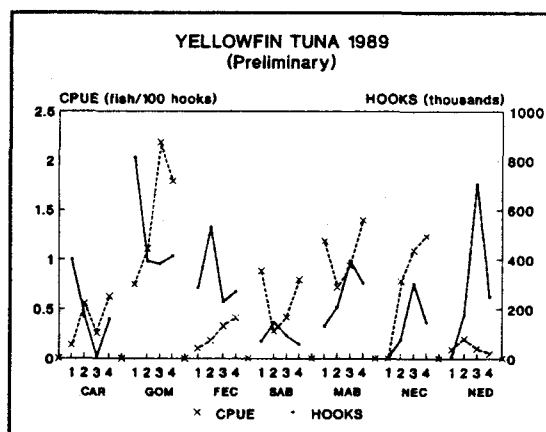


Figure 5b. Quarterly summaries of CPUE (fish/100 hooks) and reported effort (thousands of hooks) for yellowfin tuna in 1989 (preliminary) for areas CAR, GOM, FEC, SAB, MAB, NEC and NED.

= April - June; 3 = July - September; 4 = October - December. These figures demonstrate the change in catch rate and in reported effort, within year, for each species. For a given year, the reported number of hooks fished is the same for both species.

It is expected that in 1991 an analysis of the 1989 data with respect to the 1987 and 1988 data will be completed - trend analysis can be undertaken with three years of data.

REVISIONS TO THE 1991 DAILY LOGBOOK FORMS

To achieve the compilation of better data, changes have been made to the daily logbook forms and accompanying instructions for 1991, both included in this newsletter as Figures 6 and 7. These changes are:

- (1) larger (8.5" x 14") pages with the original being mailed to NMFS;
- (2) numbers of swordfish caught moved to the bottom of the form;
- (3) designation of primary target species;
- (4) addition of haulback date;
- (5) designation if set is the first set of the trip, designation if the vessel was bottom longlining, and designation if the hooks were being tended or rebaited before the haulback;
- (6) information pertinent to gillnet fishing; and
- (7) specification of the beginning and ending times for the setting of the gear and the haulback of the gear.

Making the pages larger (item 1) should make it easier for captains to fill-out the forms. Also, by receiving the original forms, the information should be more legible for data entry personnel. Information on the numbers of swordfish kept and released logically belonged on the bottom part of the form with all other species catch data (item 2). By designating the target species (item 3), analyses can be improved, thereby adding greater confidence in results by reducing the number of assumptions needed for analysis of the data. Items 4 and 5 will also assist in further analysis of the data and allows easy determination if the recorded information represent other than a single set of pelagic longline gear. Although many captains used the comments section of previous

forms to record this information, not all consistently recorded these data.

Gear information associated with gillnets can now easily be recorded (item 6) and will allow for future analyses related to the gillnet fishery. The addition of beginning and ending set and haulback times (item 7) will also allow for more sophisticated analysis of the database. Lastly, as noted on the new logbook forms, use of the current year forms will be necessary for compliance. Further, all old forms should be destroyed upon receipt of the 1991 forms.

WHO TO CONTACT FOR WHAT

Any questions concerning the overall swordfish project at the Southeast Fisheries Center, NMFS, can be directed to Dr. Gerald Scott at (305) 361-4596. Questions concerning processing and analyzing the logbook data can be directed to Mark I. Farber at (305) 361-4231. Information concerning permits can be directed to Ed Burgess at (813) 893-3722. Those needing 1991 logbooks can contact Herb Prytherch at (305) 361-4469. If you have comments on this newsletter, or other comments, please send them to Mark I. Farber, SEFC, NMFS, 75 Virginia Beach Drive, Miami, FL 33149.

Figure 6.

PLACE CARDBOARD FLAP UNDER FORM BEFORE WRITING

DO NOT WRITE IN THIS BOX

CURRENT PERMIT YEAR: 1991

NOTE: Use of Current Permit Year Forms Necessary for Compliance. DESTROY OLD FORMS.

SWORDFISH LOGBOOK - DAILY FORM

VESSEL NAME _____

OFFICIAL NUMBER _____

PERMIT NUMBER _____

SET DATE: YEAR ____ MONTH ____ DAY ____

HAULBACK DATE: MONTH ____ DAY ____

POSITION AT BEGINNING OF SET:

LATITUDE: ____° ____'N°

LONGITUDE: ____° ____'W°

WATER TEMP. ____°F

*NOTE: IF VESSEL IS FISHING SOUTH OF THE EQUATOR, PLEASE
CROSS OUT N AND ENTER S.**NOTE: IF VESSEL IS FISHING IN EASTERN HEMISPHERE, CROSS OUT
W AND ENTER E.

CAPTAIN'S SIGNATURE _____

TARGET? SWORDFISH ☐ YELLOWFIN ☐BIGEYE ☐ MIXED TUNAS ☐ SHARKS ☐

OTHER _____

GEAR USED: LONGLINE ☐ HARPOON ☐GILLNET ☐ ROD & REEL ☐ OTHER _____FIRST SET OF TRIP? ☐ YES ☐ NO

ONLY FILL IN ON LAST SET

OFF-LOADING DATE: YR ____ MON ____ DY ____
PORT _____

DEALER(S) NO(S): _____

LONGLINES: NO. HOOKS ____ NO. HOOKS BETWEEN FLOATS ____ NO. LIGHT STICKS ____

LENGTHS: MAINLINE ____ (MILES) GANGIONS ____ (FT) FLOATLINE ____ (FT)

BAIT: ☐ LIVE ☐ DEAD WERE YOU BOTTOM LONGLINING? ☐ YES ☐ NOWERE YOU TENDING OR REBAITING HOOKS BEFORE HAULBACK? ☐ YES ☐ NOGILLNETS: MESH SIZE ____ (IN) LENGTH OF NET ____ (FT) DEPTH OF NET ____ (FT)
NET MATERIAL ____ DEPTH FISHED BELOW SURFACE ____ (FT)TIMES: BEGIN SET ____ ☐ AM ☐ PM BEGIN HAULBACK ____ ☐ AM ☐ PMEND SET ____ ☐ AM ☐ PM END HAULBACK ____ ☐ AM ☐ PM

OTHER GEAR INFORMATION/COMMENTS/NOTES:

SWORDFISH AND TUNAS (NUMBERS CAUGHT)			SHARKS (NUMBERS CAUGHT)			OTHER SPECIES (NUMBERS CAUGHT)		
	KEPT	RELEASED		KEPT	RELEASED		KEPT	RELEASED
SWORDFISH			MAKO			DOLPHIN		
BIGEYE			BLUE			WAMOO		
BLUEFIN			HAMMERHEAD			KING MACKEREL		
YELLOWFIN			THRESHER			SPEARFISH		
ALBACORE			WHITE			WHITE MARLIN		
BLACKFIN			TIGER			BLUE MARLIN		
SKIPJACK TUNA			OTHER SHARKS			SAILFISH		

DUPLICATE - RETAIN FOR YOUR RECORDS

Figure 7.

DATA PROVIDED ARE
CONFIDENTIAL.

IMPORTANT INSTRUCTIONS

Please print all information clearly.

DESTROY OLD FORMS. USE ONLY CURRENT YEAR FORMS.

----- Please use a separate log sheet for each set.

Record the **VESSEL NAME**, **OFFICIAL U.S. COAST GUARD DOCUMENTATION NUMBER**, and **1991 SWORDFISH PERMIT NUMBER**. Include **CAPTAIN'S SIGNATURE**.

Record **SET DATE** (calendar day when set began) and **HAULBACK DATE**.

At the start of each set record the location to the nearest degree of **LATITUDE** and **LONGITUDE**, and the **SURFACE WATER TEMPERATURE**, in degrees Fahrenheit.

Designate primary **TARGET** species.

Record **GEAR USED**.

Specify if this set was **FIRST SET OF TRIP**.

For **LAST SET OF TRIP** record: **OFF-LOADING DATE**, **PORT**, and **NMFS DEALER(S) NUMBER(S)**. Leave blank if unknown.

Enter the following data for each set if using **LOONGLINE** gear:

- **NUMBER OF HOOKS SET**
- **NUMBER OF HOOKS BETWEEN FLOATS**
- **NUMBER OF LIGHT STICKS**
- **MILES OF MAINLINE**
- **LENGTH OF GANGIONS (in feet)**
- **LENGTH OF FLOATLINE (in feet)**
- **BAIT : indicate LIVE OR DEAD**
- **WERE YOU BOTTOM LOONGLINING (for sharks, groupers, etc..)?**
- **WERE YOU TENDING OR REBAITING HOOKS BEFORE HAULBACK?**

Enter the following data for each set if using **GILLNETS**:

- **MESH SIZE (in inches)**
- **LENGTH OF NET (in feet)**
- **DEPTH OF NET (in feet)**
- **NET MATERIAL**
- **DEPTH FISHED BELOW SURFACE (in feet)**

Enter **TIMES** when using longlines or gillnets for:

- **BEGINNING OF SET and END OF SET**
- **BEGINNING OF HAULBACK and END OF HAULBACK**

Record **NUMBERS OF SWORDFISH, TUNAS, SHARKS AND OTHER SPECIES KEPT AND RELEASED**.

Mail original pre-addressed logs to **NMFS** on the last day of the month, or if at sea at the end of the fishing trip, by folding and removing tape to expose self-sealing strip.

NOTE: If the vessel did not fish during a calendar month (for example: January 1-31), please mail original form with **VESSEL NAME**, **OFFICIAL U.S. COAST GUARD DOCUMENTATION NUMBER**, **1991 SWORDFISH PERMIT NUMBER**, and **CAPTAIN'S SIGNATURE**. State on the form (in **COMMENTS** area) **"NO FISHING DURING _____"**. Mail to **NMFS** on the last day of (month) month.

Table 1a. TOTAL NUMBER OF SWORDFISH, TUNA, AND BILLFISH REPORTED CAUGHT BY AREA, AND EFFORT IN REPORTED NUMBER OF HOOKS FISHED, FROM THE SWORDFISH MANDATORY LOGBOOKS, FOR 1987. NUMBERS CAUGHT REPRESENT KEPT PLUS DISCARDED. SEE FIGURE 1 FOR DESIGNATION OF AREAS. (SWO=SWORDFISH; YFT=YELLOWFIN; BET=BIGEYE; BFT=BLUEFIN; ALB=ALBACORE; WHM=WHITE MARLIN; BUM=BLUE MARLIN; SAI=SAILFISH.)

Area	SWO	YFT	BET	BFT	ALB	WHM	BUM	SAI	Effort
1-CAR	24,339	2,902	3,012	43	195	453	1,023	66	730,308
2-GOM	16,650	44,598	396	999	85	1,399	605	524	3,245,064
3-FEC	27,448	2,730	3,717	205	527	540	1,140	617	965,258
4-SAB	6,788	776	400	35	24	58	66	23	134,980
5-MAB	11,872	6,255	5,240	127	954	240	54	12	618,205
6-NEC	7,034	4,361	2,403	223	370	102	22	1	440,567
7-NED	22,188	273	1,809	114	189	14	18	1	622,075
8-NOREQ	297	77	124	0	4	2	4	0	8,571
9-OTHER	196	78	39	0	2	5	6	0	10,250
TOTALS	116,812	62,050	17,140	1,746	2,350	2,813	2,938	1,244	6,775,278

Table 1b. TOTAL NUMBER OF SWORDFISH, TUNA, AND BILLFISH REPORTED CAUGHT BY AREA, AND EFFORT IN REPORTED NUMBER OF HOOKS FISHED, FROM THE SWORDFISH MANDATORY LOGBOOKS, FOR 1988. NUMBERS CAUGHT REPRESENT KEPT PLUS DISCARDED. SEE FIGURE 1 FOR DESIGNATION OF AREAS. (SWO=SWORDFISH; YFT=YELLOWFIN; BET=BIGEYE; BFT=BLUEFIN; ALB=ALBACORE; WHM=WHITE MARLIN; BUM=BLUE MARLIN; SAI=SAILFISH.)

Area	SWO	YFT	BET	BFT	ALB	WHM	BUM	SAI	Effort
1-CAR	27,813	4,739	4,086	24	149	362	802	161	907,108
2-GOM	26,032	32,914	497	376	146	763	392	582	2,356,257
3-FEC	30,174	1,876	2,125	117	377	355	773	1,095	1,007,181
4-SAB	10,656	995	151	16	32	66	205	78	279,556
5-MAB	10,439	7,240	4,554	223	1,690	208	72	4	628,799
6-NEC	7,806	4,041	1,446	565	426	249	40	2	462,357
7-NED	46,749	670	2,199	128	269	45	42	1	1,008,570
8-NOREQ	483	317	281	0	2	2	8	3	31,690
9-OTHER	166	82	40	1	13	4	10	1	10,375
TOTALS	160,318	52,874	15,379	1,450	3,104	2,054	2,344	1,927	6,691,893

Table 1c. PRELIMINARY TOTAL NUMBER OF SWORDFISH, TUNA, AND BILLFISH REPORTED CAUGHT BY AREA, AND EFFORT IN REPORTED NUMBER OF HOOKS FISHED, FROM THE SWORDFISH MANDATORY LOGBOOKS, FOR 1989. NUMBERS CAUGHT REPRESENT KEPT PLUS DISCARDED. SEE FIGURE 1 FOR DESIGNATION OF AREAS. (SWO=SWORDFISH; YFT=YELLOWFIN; BET=BIGEYE; BFT=BLUEFIN; ALB=ALBACORE; WHM=WHITE MARLIN; BUM=BLUE MARLIN; SAI=SAILFISH.)

Area	SWO	YFT	BET	BFT	ALB	WHM	BUM	SAI	Effort
1-CAR	22,425	2,572	2,117	16	304	454	678	80	742,297
2-GOM	31,863	30,636	1,210	523	124	650	805	477	2,015,506
3-FEC	36,790	3,176	4,691	156	316	400	819	556	1,315,875
4-SAB	12,832	1,873	322	25	34	92	186	125	365,019
5-MAB	13,928	10,879	5,837	272	2,551	538	183	12	1,034,509
6-NEC	11,018	5,540	3,599	369	1,033	224	98	3	527,857
7-NED	46,903	1,124	2,242	158	220	113	64	4	1,143,652
8-NOREQ	1,093	417	348	0	5	9	48	84	45,399
9-OTHER	1,681	91	60	12	41	34	13	0	71,636
TOTALS	178,533	56,308	20,426	1,531	4,628	2,514	2,894	1,341	7,261,750

Table 2. QUARTERLY TABULATIONS FOR SWORDFISH AND YELLOWFIN TUNA FOR (a) 1987, (b) 1988 AND (c) 1989 (PRELIMINARY). THE AREAS ARE DEFINED IN FIGURE 1. INFORMATION INCLUDES EFFORT IN HOOKS; NUMBER OF FISH KEPT; NUMBER OF FISH DISCARDED; KEPT PLUS DISCARDED; OVERALL CATCH RATE IN UNITS OF NUMBERS OF FISH CAUGHT PER 100 HOOKS [$100(K+D)/HKS$]; NUMBER OF SETS; AND AVERAGE OF THE INDIVIDUAL CATCH RATES, EQUIVALENT TO CPUE [$AVG(C/E)$].

a.

SWORDFISH TOTALS FOR 1987							YELLOWFIN TOTALS FOR 1987						
AREA	HOOKS	KEPT	DISC	K+D	$100(K+D)/HKS$	N AVG(C/E)	KEPT	DISC	K+D	$100(K+D)/HKS$	N AVG(C/E)		
1	730308	24339	0	24339	3.333	2023	3.507	2882	20	2902	0.397	2023	0.406
2	3245064	16650	0	16650	0.513	5858	0.827	43814	784	44598	1.374	5858	1.387
3	965258	27448	0	27448	2.844	3624	3.017	2677	53	2730	0.283	3624	0.255
4	134980	6788	0	6788	5.029	492	5.607	768	8	776	0.575	492	0.543
5	618205	11872	0	11872	1.920	1650	1.997	6194	61	6255	1.012	1650	1.080
6	440567	7034	0	7034	1.597	1073	1.731	4250	111	4361	0.990	1073	1.052
7	622075	22188	0	22188	3.567	1032	3.891	272	1	273	0.044	1032	0.055
8	8571	297	0	297	3.465	21	3.519	77	0	77	0.898	21	0.893
9	10250	196	0	196	1.912	23	2.390	78	0	78	0.761	23	0.616
TOT:	6775278	116812	0	116812	1.724	15796	2.211	61012	1038	62050	0.916	15796	0.831

b.

SWORDFISH TOTALS FOR 1988							YELLOWFIN TOTALS FOR 1988						
AREA	HOOKS	KEPT	DISC	K+D	$100(K+D)/HKS$	N AVG(C/E)	KEPT	DISC	K+D	$100(K+D)/HKS$	N AVG(C/E)		
1	907108	27804	9	27813	3.066	2425	3.179	4707	32	4739	0.522	2425	0.508
2	2356257	26000	32	26032	1.105	4925	1.609	32376	538	32914	1.397	4925	1.304
3	1007181	30151	23	30174	2.996	3667	3.151	1853	23	1876	0.186	3667	0.182
4	279556	10652	4	10656	3.812	921	4.117	982	13	995	0.356	921	0.376
5	628799	10428	11	10439	1.660	1520	1.749	7090	150	7240	1.151	1520	1.277
6	462357	7802	4	7806	1.688	1002	1.664	4020	21	4041	0.874	1002	0.836
7	1008570	46747	2	46749	4.635	1688	4.709	669	1	670	0.066	1688	0.077
8	31690	483	0	483	1.524	63	1.606	317	0	317	1.000	63	1.177
9	10375	166	0	166	1.600	25	1.764	82	0	82	0.790	25	0.755
TOT:	6691893	160233	85	160318	2.396	16236	2.673	52096	778	52874	0.790	16236	0.719

c.

SWORDFISH TOTALS FOR 1989 (PRELIMINARY)							YELLOWFIN TOTALS FOR 1989 (PRELIMINARY)						
AREA	HOOKS	KEPT	DISC	K+D	$100(K+D)/HKS$	N AVG(C/E)	KEPT	DISC	K+D	$100(K+D)/HKS$	N AVG(C/E)		
1	735297	21631	583	22214	3.021	1928	3.122	2503	65	2568	0.349	1928	0.342
2	1999876	29814	2002	31816	1.591	4604	2.306	29197	851	30048	1.502	4604	1.278
3	1314745	35352	1403	36755	2.796	4513	2.948	3123	51	3174	0.241	4513	0.242
4	365019	12183	649	12832	3.515	1145	3.889	1807	66	1873	0.513	1145	0.496
5	1034509	13073	855	13928	1.346	2367	1.415	10737	142	10879	1.052	2367	1.056
6	526657	10510	469	10979	2.085	1151	2.131	5393	147	5540	1.052	1151	1.078
7	1133302	44666	1450	46116	4.069	1945	4.204	1093	22	1115	0.098	1945	0.105
8	45399	1047	46	1093	2.408	91	2.325	407	10	417	0.919	91	0.955
9	68036	1521	46	1567	2.303	143	2.388	90	1	91	0.134	143	0.117
TOT:	7222840	169797	7503	177300	2.455	17887	2.735	54350	1355	55705	0.771	17887	0.685